New Species of Recent and Fossil West American Aspidobranch Gastropods

BY

JAMES H. McLEAN

Curator of Invertebrate Zoology, Los Angeles County Museum
900 Exposition Boulevard, Los Angeles, California 90007

(Plate 24; 1 Text figure)

Five new species have been noticed during my dissertation work on western North American aspidobranch gastropods. They are here described in order to include them in the dissertation. Monographic treatment of the aspidobranch groups is part of a larger project of reviewing the western North American prosobranch gastropods, ranging from central Baja California to Alaska. The groups covered in the dissertation are to be included in the final review which is now in preparation.

A replacement name is presented here for a common species of *Tegula* along the coast of southern California, which has long been misidentified as *Tegula ligulata* (Menke, 1850).

Type material of the new species will be distributed to the U.S. National Museum, the Los Angeles County Museum, and the Stanford University Paleontological Type Collection. Additional paratypes will be sent to the California Academy of Sciences; Museum of Paleontology, University of California at Berkeley; Santa Barbara Museum of Natural History; and the San Diego Museum of Natural History.

I gratefully acknowledge the guidance of Professor Myra Keen, Curator of Malacology in the Department of Geology, and Professor Rolf Bolin in the Department of Biological Sciences of Stanford University, who have directed my dissertation work. This investigation was supported (in part) by a predoctoral fellowship, number 18,613, from the Division of General Medical Sciences, U.S. Public Health Service.

Lirularia bicostata McLean, spec. nov.

(Plate 24, figures 1 and 2)

Description of Holotype: Shell small for genus, whorls four, suture distinct, base and umbilicus rounded; aperture only slightly oblique, circular in cross section; peritreme complete but not detached from base; inner and outer lip simple. Spiral sculpture of a single carina at shoulder on third whorl; on penultimate whorl two prominent raised cords at shoulder and periphery; deep channel at suture. Base bearing two prominent broad cords, two cords of lesser magnitude within slope of umbilicus. Axial sculpture of fine incremental lines, not raised in regular sequence. Color light-brown mottled, white and dark brown areas on main spiral cords. Height 2.4 mm, diameter, 2.3 mm.

Type Material: Holotype, U.S. National Museum, cat. no. 636089. Paratype, Stanford University Paleontological Type Collection, cat. no. 9749. Four additional paratypes (all juvenile), Los Angeles County Museum, cat. no. 1134.

Type Locality: Off north side of Middle Coronado Island, Baja California, Mexico, 45 feet under *Macrocystis* kelp, screened from gravel. J. H. McLean, collector, August 10, 1963.

Additional Localities: South Coronado Island [S. S. Berry Collection, cat. no. 15231, 1 specimen]; Guadalupe Island, Baja California [California Academy of Sciences, locality nos. 24044 (8 specimens), 32819 (3 specimens)].

Discussion: The six specimens comprising the type lot are similarly sculptured and are uniformly light colored. The single specimen in the Berry Collection is gray brown. Specimens from Guadalupe Island (which were recognized in lots of *Lirularia acuticostata* Carpenter, 1864) are variably colored, with yellow, pink, brown and white mottling. These shells show less prominent development of the spiral sculpture and the basal sculpture is obsolete in some of the specimens, but this is also observed in juvenile shells of the typical lot.

Lirularia bicostata, with its reduced number of spiral cords, is similar only to *L. aresta* (Berry, 1941), a species described from the Early Pleistocene Lomita Formation of San Pedro, California, but now known to be living in California at depths of 50 to 100 fathoms off Point Loma, San Diego County, and off Point Pinos, Monterey County. In *L. aresta* the peripheral carina is covered by successive

whorls, but in *L. bicostata* it is exposed. *Lirularia aresta* has a greater number of basal cords than does *L. bicostata*. The aperture of *L. bicostata* is the least oblique of the known species in the genus. This feature is somewhat exaggerated in the figure of the holotype because the lip is slightly broken. *Lirularia bicostata* is the smallest known species in the genus; all specimens observed are less than 2.5 mm high.

Lirularia bicostata should be prevalent in sublittoral zones along the outer coast of Baja California at least as far south as Cedros Island.

The specific name is a Latin adjective meaning "double ribbed," referring to the two prominent spiral cords.

Solariella micraulax McLean, spec. nov.

(Plate 24, figures 3 and 4)

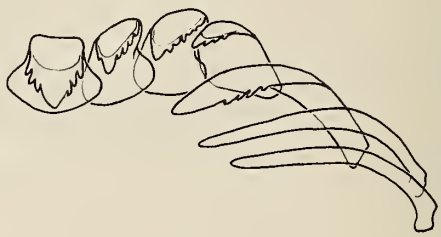
Description of Holotype: Shell of medium size for genus, whorls five, rounded, rapidly inflating; suture distinct, periphery rounded; base slightly convex, sloping evenly into broad umbilicus which penetrates nearly to spire. Aperture circular in cross section, not strongly oblique; inner and outer lip simple, peritreme nearly complete. Spiral sculpture on penultimate whorl of 23 narrow, raised, rounded cords with broader interspaces, approximately 100 cords on final whorl; cords present deep with umbilicus. Axial sculpture of minute raised growth lines passing over spiral cords, most prominent over first four cords below suture. Color brownish above periphery, base and umbilical area cream colored, interior iridescence of pink and green. Operculum multispiral, of 9 whorls, radially striate. Height 7 mm, diameter 8 mm.

Holotype: U.S. National Museum, cat. no. 210530.

Type Locality: Off Alaska Peninsula, vicinity of Shumagin Islands, U.S. Fisheries Commission sta. no. 2848, 55°10′ N. lat., 160°18′ W. long., 110 fathoms, green mud. July 31, 1888.

Additional Locality: "Captain's Bay, Unalaska, Aleutian Island, 16 fathoms, rocky, west of Pinnacles" [U.S. National Museum, cat. no. 219235, height 4.5 mm, diameter 6.2 mm].

Discussion: The two specimens from which this species is known had been unidentified in the collection of the U.S. National Museum. On the basis of the shell I had considered the species to be a *Margarites*. The dried soft parts were present in the shell of the holotype, making it possible to extract and mount the radula (Text figure 1). The radula is typical of *Solariella;* the rachidian tooth is prominently cusped, lateral teeth are cusped only on the outer edge, and the marginal teeth are greatly reduced in number. Radulae of four other species of west American *Solariella* follow the same pattern, some having two rather than three laterals. The same four species of *Solariella* also have a radially striate operculum similar to that of *S. micraulax*.



Text figure 1: Radula from holotype of *Solariella micraulax* McLean, spec. nov. Only the first three marginal teeth are shown.

From all other species of *Solariella* known from the North Pacific, *S. micraulax* differs in lacking prominent axial sculpture. Only a trace of axial sculpture is suggested by the prominent growth lines passing over the first four spiral cords adjacent to the suture. *Solariella nuda* Dall, 1896, (which has the typical radula) lacks axial sculpture in the mature shell, but the juvenile shell has a definite cancellate sculpture. *Solariella micraulax* most resembles *Margarites (Pupillaria) vorticiferus* (Dall, 1873). In the synonymy of *M. vorticiferus* I include *M. sharpii* (Pilsbry, 1898), *M. ecarinatus* Dall, 1919, and *M. avenosooki* MacGinitie, 1959. *Solariella micralaux* is smaller than *M. vorticiferus,* is not as inflated, has a less oblique aperture, and has spiral sculpture deep within the umbilicus. The latter feature is lacking in *M. vorticiferus* and other species of *Margarites (Pupillaria).*

Solariella micraulax may prove to be not uncommon in Alaska at depths greater than 100 fathoms. Dredging with fine meshed equipment has not been extensive at such depths. Shallower water dredging in Alaska has been more extensive, consequently the record of the hypotype from 16 fathoms may be exceptional.

The hypotype specimen differs markedly from the holotype in possessing a smaller number of spiral cords: six

Explanation of Plate 24

Figures 1 and 2: ***Lirularia bicostata*** McLean, spec. nov. Holotype. (x 13). Figures 3 and 4: ***Solariella micraulax*** McLean, spec. nov. Holotype. (x 4). Figures 5 and 6: ***Tegula (Agathistoma) mendella*** McLean, spec. nov. Holotype. (x 1.5). Figures 7 and 8: ***Homalopoma berryi*** McLean, spec. nov. Holotype. (x 9). Figures 9 and 10: ***Macrarene diegensis*** McLean, spec. nov. Holotype. (x 1.5). Figure 11: Paratype of ***Macrarene diegensis.*** Intermediate growth stage. (x 3). Figures 12 through 14: Paratype of ***Macrarene diegensis.*** Juvenile. (x 5).

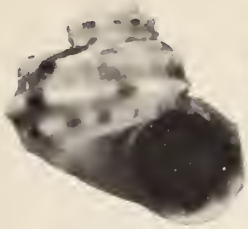


Figure 1

Figure 2

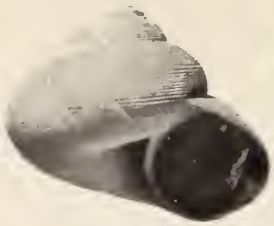


Figure 3

Figure 4

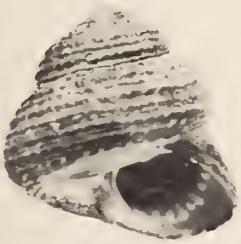


Figure 5

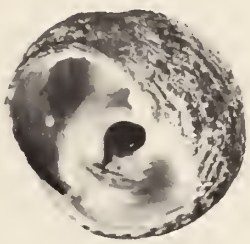


Figure 6

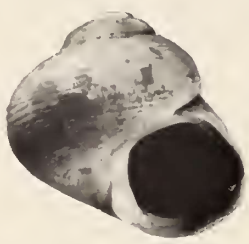


Figure 7

Figure 8

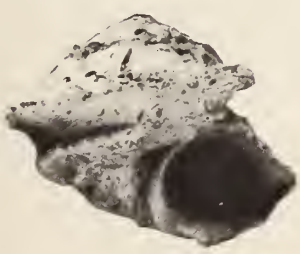


Figure 9

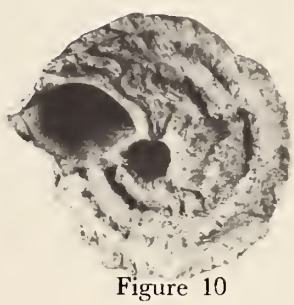


Figure 10

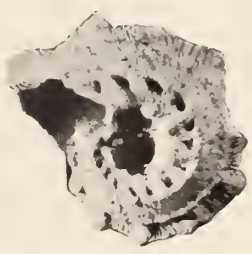


Figure 11

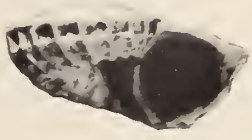


Figure 12

Figure 13

Figure 14

photo. P. Mary

on the penultimate whorl and approximately 40 on the final whorl, including the cords within the umbilicus. The basal cords of the hypotype are numerous and fine, more closely resembling those of the holotype.

The specific name is a noun derived from Greek, meaning "small furrows," with reference to the characteristic spiral sculpture.

Tegula (Agathistoma) mendella McLean, spec. nov.
(Plate 24, figures 5 and 6)

Tegula ligulata (Menke).—*of* authors, not *Trochus ligulatus* Menke, 1850, p. 173.

Omphalius fuscescens (Philippi).—*of* authors, not *Trochus fuscescens* Philippi, 1844, p. 92, pl. 3, fig. 8.

Description of Holotype: Shell large for subgenus, whorls six, suture moderately impressed, periphery rounded; base nearly flat, broadly umbilicate, three denticles at base of columella; aperture oblique, nearly circular in cross section. Spiral sculpture of nodular cords, three prominent cords on third whorl, increasing to eight cords of unequal strength on penultimate whorl, 14 major cords on final whorl and base. Spiral cords nodular in oblique series, corresponding to line of growth; minute spiral threading on and between major cords and basal cords. Ten nonnacreous cords within aperture, terminating in white denticles within lip, less prominent on roof of aperture. Axial sculpture of fine growth lines. Base eroded adjacent to aperture. Operculum multispiral, of about 18 whorls. Color brownish, darker and lighter areas on main cords, columellar area white, whitish nacre within aperture. Height 21.5 mm, diameter, 21 mm.

Type material: Holotype U.S. National Museum, cat. no. 636090. Paratypes, Los Angeles County Museum, cat. no. 1135; Stanford University Paleontological Type Collection, cat. no. 9750. Additional paratypes to be distributed.

Type Locality: Mission Bay, San Diego, California, on rocks of south breakwater inside bay entrance, at low tide and to a depth of 10 feet. J. H. McLean, collector, April 27 and December 11, 1962.

Additional Localities: *Tegula mendella* is a common species in the intertidal zone and the immediate subtidal zone in southern California. Dall (1921, p. 75) recorded *T. "ligulata"* from Monterey to Acapulco, Mexico. The lot from Monterey (U.S. National Museum, cat. no. 14845) is the Californian species but no doubt represents a locality error. Los Angeles County is the northernmost locality known for the species. The southernmost locality record in the National Museum collection is Magdalena Bay, Baja California (cat. no. 24779).

Discussion: It is unfortunate that the name of a well-known species must be changed, but no other course is possible because *Tegula ligulata* (Menke) has been misidentified. The type locality of *T. ligulata* is Mazatlan, Sinaloa, Mexico. The presence of the Californian species has not been verified at Mazatlan, but I have collected there a species of *Tegula (Agathistoma)* more closely answering the original Latin description than does the Californian species. Carpenter (1857, p. 235) redescribed *T. ligulata* in a way that accords with my material from Mazatlan, and I believe that there is no question concerning the identity of *T. ligulata*. Both *T. ligulata* and *T. mendella* are non-carinate on the periphery and non-green umbilicate. *Tegula ligulata* is uniformly smaller, angulate at the base, shows six rather than three raised cords on the third whorl, bears a heavy rugosity below the suture on the fourth and subsequent whorls, and has a non-eroded base.

Carpenter cited the Californian species in 1864 (p. 652): "*Omphalius fuscescens* Phil. Almost identical with *ligulatus,* Maz. Cat. no. 293." Philippi's species was described from Chile. His name cannot apply, because the original description and figure call for a shell with nearly flattened whorls, which is not characteristic of the Californian species. In the Mazatlan Catalogue, Carpenter (1857, p. 235) tentatively listed in the synonymy of *T. ligulata* two species described without locality by A. Adams: *Phorcus californicus* and *P. liratus* A. Adams [original description: Adams, 1853, p. 157]. These two forms apparently remain unrecognized, but cannot refer to the species in question because both descriptions call for shells showing green coloration on the columella, a characteristic of some species of *Tegula (Agathistoma),* but never observed in *T. ligulata* or *T. mendella.* Carpenter (1857a, p. 224) also mentioned a manuscript name of Nuttall, "*Trochus luridus,*" under *Omphalius fuscescens* Philippi. This name could be validated now, but this seems unwise because the name first appeared in Jay's Catalogue (Jay, 1839, p. 71) with the locality "Fayal," an island in the Azores. Thus I have been unable to find an available name for the Californian species.

The name *Tegula mendella* is derived from the Latin noun *menda* (f.), scar, plus the diminutive *-ella,* meaning "little," with reference to the frequently eroded base, a feature not observed in related species.

Macrarene diegensis McLean, spec. nov.
(Plate 24, figures 9 through 14)

Description of Holotype (mature shell): Shell of average size for genus, whorls 4, with strong projecting peripheral keel; suture distinct, umbilicus narrow; aperture oblique,